

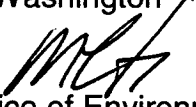


UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

January 7, 1999

MEMORANDUM

SUBJECT: Response to Comments on the Proposed Cleanup Action for the Wyckoff Groundwater Operable Unit of the Wyckoff/Eagle Harbor Superfund Site Bainbridge Island, Washington

FROM: Michael Gearheard 
Acting Director, Office of Environmental Cleanup

TO: Bruce Means, Chair
National Remedy Review Board

My staff and I appreciate the effort on the part of the National Remedy Review Board (NRRB) in reviewing the proposed cleanup action for the Wyckoff Groundwater Operable Unit. The enclosed response explains how Region 10 intends to address the following comments transmitted by the Board on the proposed remedy via memo dated August 5, 1998.

Region 10 has begun the Tiered Evaluation Approach, as presented to the Board during the July 21, 1998 meeting, to verify and confirm the effectiveness of the steam injection technology at the Wyckoff site. Currently, we are reviewing the contractor's work plan, which includes the following Tier I work activities: modeling, aquitard and contaminant distribution evaluation, water supply evaluation, habitat mitigation, soil operable unit coordination, and steam injection conceptual design.

Tier II has also been implemented and will be conducted simultaneously with the first tier. Tier II includes applying steam to Wyckoff soil cores in laboratory bench-scale tests. Region 10 is working closely with Eva Davis, EPA's steam expert at the Kerr Lab, who is performing these tests. We are also providing salary dollars to the lab to fund their assistance on this project. Tiers I and II will be completed prior to the proposed plan and contingency Record of Decision (ROD).

Tier III includes a field-scale test to assess the effectiveness of the technology on-site, which would be conducted post-ROD if the technology proves promising during the first two tiers. Other Tier III activities would include assessing the ability to drive sheet pile and the effectiveness of sheet piles in preventing migration of heat and contamination, and assessing the effectiveness of the vapor cover.

Region 10 continues to coordinate with the Washington State Department of Ecology, Suquamish Tribe, City of Bainbridge Island and its community, EPA Technology Innovations Office (TIO), Office of Research and Development's Superfund Innovative Technology Evaluation (SITE) Program and labs, and experts in the field of steam injection.

Enclosure:

RESPONSE TO NRRB COMMENTS ON WYCKOFF GROUNDWATER PROPOSED ACTION

NRRB Comment No. 1

There are still inadequate technical data on some important issues at this early stage of planning. The Board recommends that the Region pay careful attention to evaluating factors such as:

- (a) The effect of the shallow overburden on the efficiency of creosote recovery by steam injection;
- (b) The effectiveness of sheet piling and vapor cap in preventing releases from the treatment zone;
- (c) The effectiveness of hydrous pyrolysis/oxidation, biodegradation, sorption, and other processes in reducing contaminant concentrations. These processes may affect significantly the residual contaminant levels even after steam injection has ceased, and should be considered in setting targets for removal efficiency.

Region 10 Response

Comments (a) and (b) are largely post-Record of Decision (ROD) engineering and design issues which we plan to evaluate during Tier III, consisting of field-scale studies to support remedial design. Prior to issuance of the proposed plan, however, modeling will be conducted to estimate the steam injection rate and pressure that would have to be applied to prevent fracturing of the soil and possible well failure. We do not believe the shallow overburden poses significant concern because the vapor cover will be designed to withstand steam pressure and temperature needed to remediate this site.

Preliminary work has been conducted to conceptually design a vapor cover system to provide a barrier between the steam treatment process and the atmosphere. The cover would prevent steam and contaminated vapors from escaping, and prevent air from being drawn into the shallow vapor extraction system underneath the cover. We do not believe that capping presents significant technical difficulties. More detailed designs will occur as part of the remedial design (RD).

Regarding the effectiveness of sheet piling, Region 10 plans to research different sheet piles and different configurations, including computer modeling to evaluate leakage, availability and costs, probability of successful installation, etc., during Tier I. A sheet pile driving test using several sections of sheet pile types and hammers will be conducted to support post-ROD RD, if warranted. The driveability test program will reduce site-specific uncertainty associated with installing sheet piles through dense subsurface deposits and into the underlying aquitard.

Finally, in response to Comment No. 1 (c), Eva Davis, from the Kerr Lab in Ada, Oklahoma is conducting a steam injection bench-scale treatability study for Wyckoff (using cores collected from the site). One of the objectives of this laboratory test is to determine if oxidation of residual creosote is occurring, i.e., will oxidation of the remaining creosote compounds occur naturally, providing a "polishing" step after the completion of the steam injection? Additionally, documented results of hydrous pyrolysis/oxidation occurring at the Visalia site in California are available from the Lawrence Livermore National Laboratory, and will be fully evaluated by Region 10 in setting targets of removal efficiency for Wyckoff.

NRRB Comment No. 2

The materials provided to the Board did not specify target contaminant concentrations in the saturated zone that would result in protective levels in the marine water column and sediments. Before issuing the proposed plan, the Region should identify removal efficiency and residual contaminant levels that will be protective and thus eliminate the need for long-term containment.

Region 10 Response

The removal efficiency and residual contaminant levels necessary for a protective remedy (i.e., a remedy that achieves federal and state marine water quality standards) will be established through a combination of lab treatability studies and modeling, which are currently ongoing and will be completed pre-ROD. The lab treatability study will determine whether the mobile creosote can be recovered from the site soils (and how much), while attempting to answer the most important question of the amount of residual creosote that would remain after the steam injection.

The process and effectiveness of steam injection will also be evaluated by modeling. The major questions to be addressed by modeling are:

- What are the removal efficiency and recovery rate (i.e., how long will the period of active treatment be), and predicted percentage of creosote remaining after treatment? (Steam Modeling)
- What residual contaminant concentrations are acceptable for soil and still achieve a given water quality standard at a marine water and sediment point of compliance with and without containment? (Flow and Transport Modeling)
- What is the thermal effect of steam injection outside the treatment zone? (Heat Flow Modeling)
- What is the predicted movement of steam, mobilized creosote, and vapors during steam injection? (Steam Modeling)

The steam models currently under consideration are M2NOTS, developed by U.C. Berkeley, and NUFT, developed by the Lawrence Livermore National Laboratory. The information gained through this modeling effort will help determine the likelihood of success of steam injection at Wyckoff and will aid in development of criteria for proceeding to the field-scale stage (Tier III). The criteria will be developed prior to the proposed plan, and will be included in the proposed plan (scheduled for June 1999) for public comment.

NRRB Comment No. 3

The Board believes it is reasonable to use a tiered approach to determine the likely effectiveness of steam injection and whether to invoke the contingent remedy (containment). However, the materials presented to the Board did not include criteria for determining whether the Region will proceed from analytical and bench-scale studies to field-scale testing. Criteria for evaluating the field results that would dictate either full-scale implementation of steam injection or the contingent remedy are also important. The Region should develop these criteria and include them in the proposed plan for this cleanup decision.

Region 10 Response

Results from the bench-scale and modeling efforts described above will provide significant answers to the questions relating to the effectiveness of steam in achieving site remedial action objectives. Region 10 plans to work closely with experts in the thermal remediation field to determine the criteria for evaluating modeling and subsequent field results which would support the decision to proceed forward to full-scale remediation or fall back on the contingent remedy (containment).

TIO and Region 9 is taking the lead to organize a Thermal Remediation Technology Review Panel, which would include the major players within this field. The goals of this panel are to provide expert technical assistance to EPA to 1) develop an evaluation process for the application of thermal technologies for remediation of Superfund sites; and 2) provide input on design and operational issues at sites where EPA is proceeding with thermal technologies. The panel will also provide information gained from other sites, where steam injection is used, to help answer some of the technical questions that are mentioned under the Board's Comment No. 1.

Region 10 has been asked to both participate in the forum and to offer Wyckoff as a potential candidate site for review by the panel. Region 10 is interested in this request and will be working closely with TIO, Region 9, and the Kerr Lab in the next few months to become more involved in this process.

The criteria developed with the help and input of the panel will be included in the proposed plan.

NRRB Comment No. 4

The Board understands that the Region does not intend to fully implement the steam injection remedy unless the tiered evaluation indicates that it may achieve a permanent cleanup and eliminate the need for long-term containment. However, given the uncertainty about this technology's effectiveness at this site, some degree of containment may be necessary subsequent to implementation of steam injection. The Board recommends that the Region include in the proposed plan information on the potential costs of steam-injection-plus-containment scenario. This will ensure that all stakeholders and decision makers are aware of the potential for these additional costs.

Region 10 Response

Region 10 agrees to include the potential cost of steam injection-plus-containment in the proposed plan.

Another issue regarding containment was also raised during the July 21, 1998 meeting. One member asked whether containment could be implemented prior to the implementation of steam technology. Region 10 has considered this option but does not believe it would be cost-effective while the evaluation of steam injection is ongoing. Constructing a slurry wall around the site would cost approximately \$25 million and would destroy approximately 3 acres of intertidal habitat. We do not want to construct a slurry wall unless we are convinced that steam injection will not work. Constructing a sheet pile wall around the site, which is part of the steam injection option, would cost approximately \$7.2 million. If the decision is made that steam injection will not work, the sheet pile wall would have to be taken out and the slurry wall installed. Our preference is to move through the evaluation process as quickly as possible and not perform an interim remedy that may be inconsistent with our final decision for the site.

cc: Wayne Pierre, Region 10 NRRB Representative
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